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Propylene glycol dinitrate: Charles E. Munroe. During the Great War not only was the demand for glycerine for use in making nitroglycerin greatly increased, but, as glycerine is normally produced from fats and oils which grew in demand for use in food, there was a special shortage in the supply. A promising substitute, though not a full equivalent for this, was found in propylene glycol dinitrate. Propylene glycol dinitrate is a nitric ester produced by the nitration of one of the isomeric forms of propylene glycol, which latter is the second member of the group of dihydroxy alcohols or glycols. The nitration of the glycol to produce this explosive is carried on in the same manner and with the use of the same acids as that of glycerine to produce nitroglycerine and the product has a similar appearance to the latter. The results of tests reported show that this propylene glycol dinitrate may be used as nitroglycerine is in the manufacture of dynamites and blasting gelatins. It is found to be less sensitive, to have a lower freezing point, to be decidedly more volatile, and to develop less strength than nitroglycerine, but in an emergency it may be efficiently used as an explosive, especially in mining and other industrial operations.

Further investigations concerning the relations between terrestrial magnetism, terrestrial electricity, and solar activity: Louis A. Bauer. The following chief facts have resulted from the present investigation: (1) The earth's average intensity of magnetism, as well as the strength of the electric currents circulating in the earth's crust, decreases with increased solar activity. The change between minimum and maximum sunspot activity in the case of the former may amount to six per cent. and more and in the case of the latter one hundred per cent. and more. (2) The atmospheric potential-gradient, or the deduced negative charge on the surface of the earth, increases with increased solar activity, the range in the variation between minimum and maximum sunspot activity being about 15 to 20 per cent. The electric conductivity of the atmosphere, on the other hand, shows but little, if any, systematic variations during the sunspot cycle. Accordingly, since the vertical conduction-current of atmospheric electricity is derived from the product of the potential-gradient and the electric conductivity, it is found that this vertical current increases in strength with increased solar activity; the range of the variation between the minimum and maximum sunspot activity is about 20 to 25 per cent. It would thus appear that atmospheric electricity, like terrestrial magnetism, is controlled by cosmic factors. These new results have an important bearing upon theories of atmospheric electricity. (3) Regarding the daily and monthly fluctuations in terrestrial magnetism, earth currents, and atmospheric electricity, as measured by the quantity, $H\,R$, where H is the intensity of the field and R the range in the element during the period considered, it is found that while in general, the magnetic and earth-current fluctuations increase with increased solar activity, the electric fluctuations, as shown by potential-gradient observations, apparently decrease with increased solar activity. (The latter result, however, should be regarded as but a preliminary one and it is receiving further investigation.) (4) Instead of using the sunspot numbers direct for comparison with magnetic and electric variations, it is found that a more satisfactory measure of solar activity may be based upon the monthly range of sunspot frequency, or upon the average numerical departure of the daily sunspot numbers from the mean of the month. In brief, there is indicated that a better measure of the radiations and emanations affecting the earth's magnetic and electric conditions is some quantity measuring the variability, or rate of change, in the sunspot numbers, rather than the numbers themselves. By measuring in this manner the variations in solar activity, and adopting a similar measure with regard to the solar constant values obtained by the Smithsonian Institution at Calama, Chili, for the two years 1919 to 1920, a good agreement, on the whole, is found between the two sets of measures of solar activity.

On mean relative and absolute parallaxes: Keivin Burns. This paper shows that the mean parallax of a group of stars, distributed at random, is 3.56 times the mean total proper motion divided by the mean total (uncorrected) radial velocity. By this formula the mean parallax was computed for the bright stars of each spectral class. The results are in good agreement with those obtained by Campbell, who used radial velocities freed from the motion of the sun and the tau components of proper motion. The newer method is much less laborious.

The mean parallax for those stars whose relative parallax has been observed was computed and the correction to reduce to absolute was derived. This was found to be 0.″010. This correction is the mean parallax of the comparison stars, which is in fair agreement with the value derived from the mean proper motion of these stars.